

<b>INVITATION TO BID</b>		<b>BID DUE DATE AND TIME</b>	
BOARD OF SUPERVISORS OF LOUISIANA STATE UNIVERSITY AND AGRICULTURAL & MECHANICAL COLLEGE		<b>01/17/2013</b> <b>11:00 AM</b> <b>CT</b>	
<b>SOLICITATION 000011766</b> VENDOR # VENDOR NAME AND ADDRESS <div style="border: 1px solid black; height: 100px; width: 350px; margin-top: 10px;"></div>		RETURN BID TO LSU LOUISIANA STATE UNIV. PURCHASING OFFICE 213 THOMAS BOYD HALL Baton Rouge      LA 70803 BUYER Amy H Bourgeois BUYER PHONE (225)578-2304 ISSUE DATE 12/12/2012	
TITLE: M-18 REACH-IN GROWTH CHAMBER WITH HID LIGHTING			
<b>To Be Completed By Bidder</b>			
1. _____ "No Bid" (sign and return this page only). 2. _____ My Company does not wish to receive future solicitations for this commodity code. 3. Specify your Delivery: To be made within _____ days after receipt of order. 4. Specify your Payment Terms: _____. Prompt payment cash discounts for less than 30 days and less than 1% will be accepted, but will not be considered in determining awards. On indefinite quantity term contracts, cash discounts will be accepted and taken, but will not be considered in determining awards. 5. Specify your Bid Reference Number: _____. (This number will appear on any resulting order or contract.)			
<b>General Instructions to Bidders</b>			
1. Sealed bids for furnishing the items and/or services specified are hereby solicited, and will be received by the issuing LSU Campus/Department at the "Return Bid To" address stated above, until the specified due date and time. 2. Bids must be signed by a person authorized to bind the vendor. In accordance with Louisiana R.S. 39:1594, the person signing the bid must be: (1) a current corporate officer, partnership member, or other individual specifically authorized to submit a bid as evidenced in the appropriate records filed with the Louisiana Secretary of State; or (2) an individual authorized to bind the vendor as evidenced by a corporate resolution, certificate or affidavit; or (3) other documents indicating authority which are acceptable to the public entity. 3. Read the entire solicitation, including all terms, conditions and specifications. 4. All bid information and prices must be typed or written in ink. Any corrections, erasures or other forms of alteration to unit prices are to be initialed by the bidder. 5. Bid prices shall include all delivery charges paid by the vendor, F.O.B. LSU Destination, unless otherwise provided in the solicitation. Any invoiced delivery charges not quoted and itemized on the LSU purchase order are subject to rejection and non-payment. 6. Payment is to be made within 30 days after receipt of properly executed invoice, or delivery and acceptance, whichever is later. Delinquent payment penalties are governed by L.R.S. 39:1695. 7. By signing this solicitation, the bidder certifies compliance with all general instructions to bidders, terms, conditions and specifications; and further certifies that this bid is made without collusion or fraud.			
BIDDER (Name of Firm)		MAILING ADDRESS	
AUTHORIZED SIGNATURE		CITY, STATE ZIP	
PRINTED NAME		PHONE #	
TITLE		FAX #	
E-MAIL		FEDERAL TAX ID #	

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These standard terms and conditions shall apply to all LSU solicitations, unless otherwise specifically amended and provided for in the special terms and conditions, specifications, or other solicitation documents. In the event of conflict between the General Instructions to Bidders or Standard Terms & Conditions and the Special Terms & Conditions, the Special Terms & Conditions shall govern.

Bids submitted are subject to provisions of the laws of the State of Louisiana, including but not limited to: the Louisiana Procurement Code (R.S. 39:1551-1736); Purchasing Rules and Regulations (Title 34 of the Louisiana Administrative Code); Executive Orders; and the terms, conditions, and specifications stated in this solicitation.

**1. Bid Delivery and Receipt**

To be considered, sealed bids must be received and time-stamped at the "Return Bid To" address no later than the due date and time specified herein. Sealed bids cannot be accepted by telegraph, fax, or e-mail. Price alterations and addenda to bids may be submitted by telegraph or fax, and will be considered provided bidder's sealed bid, price alterations and addenda have been received in the purchasing office prior to bid opening time. Late bids cannot be accepted per L.A.C. 34:I.517, and shall be returned unopened.

**2. Bid Forms**

Bids are to be submitted on and in accordance with the LSU solicitation forms provided, and must be signed by an authorized agent of the vendor. Bids submitted on other forms or in other price formats may be considered informal and may be rejected in part or in its entirety. Bids submitted in pencil and/or bids containing no original signature indicating the bidder's intent to be bound will not be accepted.

**3. Interpretation of Solicitation/Bidder Inquiries**

If bidder is in doubt as to the meaning of any part or requirement of this solicitation, bidder may submit a written request for interpretation to the Buyer-of-Record at the address and/or fax number shown above. Written inquiries must be received in the Purchasing Office no later than five (5) calendar days prior to the opening of bids, and shall be clearly cross-referenced to the relevant solicitation/specification in question.

No decisions or actions shall be executed by any bidder as a result of oral discussions with any LSU employee or consultant. Any interpretation of the documents will be made by formal addendum only, issued by the Purchasing Office, and mailed or delivered to all bidders known to have received the solicitation. LSU shall not be responsible for any other interpretations or assumptions made by bidder.

**4. Bid Opening**

Bidders may attend the public bid opening of sealed bids and proposals. No information or opinions concerning the ultimate contract award will be given at bid opening or during the evaluation process. Written bid tabulations will not be furnished. Bids may be examined within 72 hours after bid opening. Information pertaining to completed files may be secured by visiting the Purchasing Office during normal working hours.

**5. Special Accommodations**

Any "qualified individual with a disability" as defined by the Americans with Disabilities Act, who has submitted a bid and desires to attend the public bid opening, must notify the Purchasing Office in writing not later than seven days prior to the bid opening date of their need for special accommodations. If the request cannot be reasonably provided, the individual will be informed prior to the bid opening.

**6. Standards of Quality**

Any product or service bid shall conform to all applicable federal, state and local laws and regulations, and the specifications contained in the solicitation. Any manufacturer's name, trade name, brand name, or catalog number used in the specification is for the purpose of describing the standard of quality, performance, and characteristics desired; and is not intended to limit or restrict competition. Bidder must specify the brand and model number of the product offered in his bid. Bids not specifying brand and model number shall be considered as offering the exact product specified in the solicitation.

**7. New Products/Warranty/Patents**

All products bid for purchase must be new, never previously used, of the manufacturer's current model and/or packaging, and of best quality as measured by acceptable trade standards. No remanufactured, demonstrator, used or irregular products will be considered for purchase unless otherwise specified.

The manufacturer's standard published warranty and provisions shall apply, unless more stringent warranties are otherwise required by LSU and specified in the solicitation. In such cases, the bidder and/or manufacturer shall honor the specified warranty requirements, and bid prices shall include any premium costs of such coverage.

Bidder guarantees that the products proposed and furnished will not infringe upon any valid patent or trademark; and shall, at its own expense, defend any and all actions or suits charging such infringement, and shall save LSU harmless.

**8. Descriptive Information**

Bidders proposing an equivalent brand or model are to submit with the bid descriptive information (such as literature, technical data, illustrations, etc) sufficient for LSU to evaluate quality, suitability, and compliance with the specifications. Failure to

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submit descriptive information may cause bid to be rejected. Any changes made by bidder to a manufacturer's published specifications shall be verifiable by the manufacturer. If items bid do not fully comply with specifications, bidder must state in what respect items deviate. Bidder's failure to note exceptions in its bid will not relieve the bidder from supplying the actual products requested.

#### 9. Bids/Prices/F.O.B. Point

- The bid price for each item is to be quoted on a "net" basis and F.O.B. LSU Destination, i.e. title passing upon receipt and inclusive of all delivery charges, any item discounts, etc.
- Bids other than F.O.B. LSU Destination may be rejected.
- Bids indicating estimated freight charges may be rejected.
- Bids requiring deposits, payment in advance, or C.O.D. terms may be rejected.
- Bidders who do not quote "net" item prices and who separately quote an overall "lump sum" freight cost or discount for all items shall be considered as submitting an "all-or-none" bid for evaluation and award purposes; and risk rejection if award is made on an item basis.
- Prices shall be firm for acceptance for a minimum of 30 days, unless otherwise specified. Bids conditioned with shorter acceptance periods may be rejected.
- Prices are to be quoted in the unit/packaging specified (e.g. each, 12/box, etc), or may be rejected.
- In the event of extension errors, the unit price bid shall prevail.

#### 10. Taxes

Vendor is responsible for including all applicable taxes in the bid price. LSU is exempt from all Louisiana state and local sales and use taxes. By accepting an award, resident and non-resident firms acknowledge their responsibility for the payment of all taxes duly assessed by the State of Louisiana and its political subdivisions for which they are liable, including but not limited to: franchise taxes, privilege taxes, sales taxes, use taxes, ad valorem taxes, etc.

#### 11. Terms and Conditions

This solicitation contains all terms and conditions with respect to the purchase of the goods and/or services specified herein. Submittal of any contrary terms and conditions may cause your bid to be rejected. By signing and submitting a bid, vendor agrees that contrary terms and conditions which may be included in its bid are nullified; and agrees that this contract shall be construed in accordance with this solicitation and governed by the laws of the State of Louisiana.

#### 12. Vendor Forms/LSU Signature Authority

The terms and conditions of the LSU solicitation and purchase order/contract shall solely govern the purchase agreement, and shall not be amended by any vendor contract, form, etc.

The University's chief procurement officer, or authorized designee, is delegated sole authority to execute/sign any vendor contracts, forms, etc, on behalf of LSU. Departments are expressly prohibited from signing any vendor forms.

Any such vendor contracts/forms bearing unauthorized signatures shall be null and void, shall have no legal force, and shall not be recognized by LSU in any dispute arising therefrom. Vendors who present any such forms to department users for signature without regard to this strict LSU policy may face contract cancellation, suspension, and/or debarment.

#### 13. Awards

Award will be made to the lowest responsible and responsive bidder. LSU reserves the right: (1) to award items separately, grouped, or on an all-or-none basis, as deemed in its best interest; (2) to reject any or all bids and/or items; and (3) to waive any informalities.

All solicitation specifications, terms and conditions shall be made part of any subsequent award as if fully reproduced and included therein, unless specifically amended in the formal contract.

#### 14. Acceptance of Bid

Only the issuance of an official LSU purchase order/contract, a Notification of Award letter, or a Notification of Intent to Award letter shall constitute the University's acceptance of a bid. LSU shall not be responsible in any way to a vendor for goods delivered or services rendered without an official purchase order/contract.

#### 15. Applicable Law

All contracts shall be construed in accordance with and governed by the laws of the State of Louisiana.

#### 16. Awarded Products/Unauthorized Substitutions

Only those awarded brands and numbers stated in the LSU contract are approved for delivery, acceptance, and payment purposes. Any substitutions require prior approval of the Purchasing Office. Unauthorized product substitutions are subject to rejection at time of delivery, post-return at vendor's expense, and non-payment.

#### 17. Testing/Rejected Goods

Vendor warrants that the products furnished will be in full conformity with the specification, drawing or sample, and agrees that this warranty shall survive delivery, acceptance, and use. Any defect in any product may cause its rejection. LSU reserves the right to test products for conformance to specifications both prior to and after any award. Vendor shall bear the cost of testing

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if product is found to be non-compliant. All rejected goods will be held at vendor's risk and expense, and subject to vendor's prompt disposition. Unless otherwise arranged, rejected goods will be returned to the vendor freight collect.

**18. Delivery**

Vendor is responsible for making timely delivery in accordance with its quoted delivery terms. Vendor shall promptly notify the LSU Department and/or Purchasing Office of any unforeseen delays beyond its control. In such cases, LSU reserves the right to cancel the order and to make alternative arrangements to meet its needs.

**19. Default of Vendor**

Failure to deliver within the time specified in the bid/award will constitute a default and may be cause for contract cancellation. Where the University has determined the vendor to be in default, LSU reserves the right to purchase any or all goods or services covered by the contract on the open market and to surcharge the vendor with costs in excess of the contract price. Until such assessed surcharges have been paid, no subsequent bids from the defaulting vendor will be considered for award.

**20. Vendor Invoices**

Invoices shall reference the LSU purchase/release order number, vendor's packing list/delivery ticket number, shipping/delivery date, etc. Invoices are to be itemized and billed in accordance with the order, show the amount of any prompt payment discount, and submitted on the vendor's own invoice form. Invoices submitted by the vendor's supplier are not acceptable.

**21. Delinquent Payment Penalties**

Delinquent payment penalties are mandated and governed by Louisiana R.S. 39:1695. Vendor penalties to the contrary shall be null and void, shall have no legal force, and shall not be recognized by LSU in any dispute arising therefrom.

**22. Assignment of Contract/Contract Proceeds**

Vendor shall not assign, sublet or transfer its contractual responsibilities, or payment proceeds thereof, to another party without the prior written consent and approval of the Purchasing Office. Unauthorized assignments of contract or assignments of contract proceeds shall be null and void, shall have no legal force, and shall not be recognized by LSU in any dispute arising therefrom.

**23. Contract Cancellation**

LSU has the right to cancel any contract for cause, in accordance with purchasing rules and regulations, including but not limited to: (1) failure to deliver within the time specified in the contract; (2) failure of the product or service to meet specifications, conform to sample quality or to be delivered in good condition; (3) misrepresentation by the vendor; (4) fraud, collusion, conspiracy or other unlawful means of obtaining any contract with the University; (5) conflict of contract provisions with constitutional or statutory provisions of state or federal law; (6) any other breach of contract.

LSU has the right to cancel any contract for convenience at any time by giving thirty (30) days written notice to the vendor. In such cases, the vendor shall be entitled to payment for compliant deliverables in progress.

**24. Prohibited Contractual Arrangements**

Per Louisiana R.S. 42:1113.A, no public servant, or member of such a public servant's immediate family, or legal entity in which he has a controlling interest shall bid on or enter into any contract, subcontract, or other transaction that is under the supervision or jurisdiction of the agency of such public servant. See statute for complete law, exclusions, and provisions.

**25. Equal Employment Opportunity Compliance**

By submitting and signing this bid, vendor agrees to abide by the requirements of the following as applicable: Title VI and VII of the Civil Rights Act of 1964, as amended by the Equal Opportunity Act of 1972; federal Executive Order 11246; federal Rehabilitation Act of 1973, as amended; the Vietnam Era Veteran's Readjustment Assistance Act of 1974; Title IX of the Education Amendments of 1972; the Age Act of 1975; the Americans with Disabilities Act of 1990. Vendor agrees not to discriminate in its employment practices, and will render services under any contract entered into as a result of this solicitation without regard to race, color, religion, sex, age, national origin, veteran status, political affiliation, handicap, disability, or other non-merit factor. Any act of discrimination committed by vendor, or failure to comply with these statutory obligations when applicable, shall be grounds for termination of any contract entered into as a result of this solicitation.

**26. Mutual Indemnification**

Each party hereto agrees to indemnify, defend, and hold the other, its officers, directors, agents and employees harmless from and against any and all losses, liabilities, and claims, including reasonable attorney's fees arising out of or resulting from the willful act, fault, omission, or negligence of the indemnifying party or of its employees, contractors, or agents in performing its obligations under this agreement, provided however, that neither party hereto shall be liable to the other for any consequential damages arising out of its willful act, fault, omission, or negligence.

**27. Certification of No Suspension or Debarment**

By signing and submitting this bid, bidder certifies that its company, any subcontractors, or principals thereof, are not suspended or debarred under federal or state laws or regulations. A list of parties who have been suspended or debarred by federal agencies is maintained by the General Services Administration and can be viewed on the internet at [www.epsls.gov](http://www.epsls.gov).

PRICE SHEET		INVITATION TO BID		PAGE 5	
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ITEM No.	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	EXTENDED AMOUNT
0001	<p>UNLESS SPECIFIED ELSEWHERE, SHIP ALL ITEMS TO:</p> <p>LSU RICE RESEARCH STATION Jim Oard LSU AgCenter 1373 Caffey Road Rayne, LA 70578</p> <p>ALL-OR-NONE AWARD: It is the intent of the University to award all items on an all-or-none basis to the overall lowest responsive and responsible bidder.</p> <p>Commodity Code: 495-48 M-18 reach-in growth chamber with HID lighting per attached specifications. Specify Manufacturer / Brand Bid: Specify Model / Number Bid:</p>	1.00	EA	\$ _____	\$ _____

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- 01 Bid prices are to be quoted FOB LSU/DESTINATION and inclusive of any and all applicable shipping and handling charges.
- 02 Sealed Bid Delivery Instructions and Advisory: To assure consideration, your bid must be submitted in a sealed envelope or package and should be clearly and prominently marked with the solicitation number and bid due date, or may be submitted using the special bid return label if one was furnished for that purpose. Bidders are advised that the U.S. Postal Service does not make deliveries to our physical location. USPS mail is delivered to the University's mail center and is redelivered using internal resources. Bidders may deliver bids by hand or by a courier service to our physical location at the "Return Bid To" address specified. The University shall not be responsible for any delays caused by the Bidder's chosen means of bid delivery. Bidder is solely responsible for the timely delivery of its bid, and failure to meet the bid due date and time shall result in rejection of the bid. Your attention is also directed to Standard Terms & Conditions No. 1 - Bid Delivery and Receipt.
- 03 A preference, if applicable, may be allowed for products produced, manufactured, assembled, grown or harvested in Louisiana. Do you claim this preference? Yes \_\_\_\_\_ No \_\_\_\_\_. Note: Preferences shall not apply to service contracts. Is your Louisiana business workforce composed of a minimum of fifty percent Louisiana residents? Yes \_\_\_\_\_ No \_\_\_\_\_. Specify Item Number and location within Louisiana where the product is/was produced, manufactured, assembled, grown or harvested:  
\_\_\_\_\_. Note: This preference is not applicable for services.
- 04 LSU is a member of the National Association of Educational Procurement (NAEP) and the E & I Cooperative Purchasing Service.
- 05 U.S. PRODUCT PREFERENCE: IN ACCORDANCE WITH RS 39:1595.7, IN THE EVENT A CONTRACT IS NOT ENTERED INTO FOR LA PRODUCTS PURCHASED UNDER THE PROVISIONS OF RS 39:1595, ANY PERSON WHO PURCHASES MATERIALS, SUPPLIES, PRODUCTS, PROVISIONS, OR EQUIPMENT UNDER THE PROVISIONS OF THIS CHAPTER MAY PURCHASE SUCH ITEMS WHICH ARE MANUFACTURED (MADE) IN THE U.S., & EQUAL IN QUALITY TO NON-U.S. ITEMS PROVIDED THAT ALL OF THE FOLLOWING CONDITIONS ARE MET: 1. COST OF SUCH ITEMS DOES NOT EXCEED COST OF OTHER ITEMS WHICH ARE MADE OUTSIDE THE U.S. BY MORE THAN 5%. 2. THE VENDOR OF SUCH ITEMS AGREES TO SELL THE ITEMS AT THE SAME PRICE AS THE LOWEST BID OFFERED ON SUCH ITEMS. 3. IN CASES WHERE MORE THAN ONE BIDDER OFFERS ITEMS MADE IN THE U.S. WHICH ARE WITHIN 5% OF THE LOWEST BID, THE BIDDER OFFERING THE LOWEST BID ON SUCH ITEMS IS ENTITLED TO ACCEPT THE PRICE OF THE LOWEST BID MADE ON SUCH ITEMS. 4. THE VENDOR CERTIFIES THAT SUCH ITEMS ARE MADE IN THE U.S. FOR THE PURPOSES OF THIS PREFERENCE, (1) "MANUFACTURED &/OR MADE IN THE U.S." MEANS PRODUCED BY A PROCESS IN WHICH THE MANUFACTURING, FINAL ASSEMBLY, PROCESSING, PACKAGING, TESTING, & ANY OTHER PROCESS THAT ADDS VALUE, QUALITY, OR RELIABILITY TO ASSEMBLED ARTICLES, MATERIALS, OR SUPPLIES, OCCUR IN THE U.S. (2) "U.S." MEANS THE U.S. & ANY PLACE SUBJECT TO THE JURISDICTION OF THE U.S. DO YOU CLAIM THIS PREFERENCE? \_\_\_\_\_ YES. SPECIFY LINE NUMBER(S): \_\_\_\_\_ SPECIFY U.S. LOCATION WHERE THIS PRODUCT IS MADE: \_\_\_\_\_

# M-18 REACH-IN GROWTH CHAMBER WITH HID LIGHTING

## GENERAL SPECIFICATION

These specifications describe a system of components to produce a plant growth chamber. Within the chamber there shall be a "growing zone" generally defined as "all space within the chamber that is 6" or more from a ceiling, wall or floor surface". Within this zone a particular reference plane for measurement of all performance parameters will exist 36" below the ceiling barrier. In a chamber fully loaded with uniform plant material, this plane will exist 3" above the top of the uniform plants.

Negative airflow from top-to-bottom in the growing zone shall be provided. Airflow is to be continuously re-circulated in such a manner that the maximum diffusing tray may be raised or lowered in one (1) inch increments.

Temperature within the chamber is maintained by a proportioning refrigeration system which mixes the two refrigerant phases as they entered the evaporator. Temperature set point is controlled by our TC2 microprocessor controller. Condensing unit shall be air-cooled and located on the floor next to the chamber.

The chamber consists of four parts:

- (1) Plant Growth Chamber Module
- (2) Light Cap Module
- (3) Refrigeration and Air Handling Module
- (4) Power and Control Module

- (1) The Plant Growth Chamber Module: shall be pre-formed aluminum sandwich panels containing expanded polystyrene foam. These self-supporting panels are to be assembled to form the walls and floor and to support the Light Cap Module. The panels are to be joined at all corners with members not requiring through bolts to inside surfaces. All joints are to be sealed.
- (2) The Light Cap Module: shall be mounted to the walls and serve as a light-tight cover for the top of the chamber. The light cap will consist of twelve (12) 400 watt bulbs ( $\frac{1}{2}$  High Pressure Sodium and  $\frac{1}{2}$  Metal Halide) mounted in specially designed Coilzak reflectors. Bulbs will be evenly spaced over the chamber to provide uniform light intensity over the plant growth area. Lamp cooling shall be accomplished through the use of a separate cooling system mounted above the light cap. System shall consist of blowers and coils to provide independent temperature control of the lamp canopy. No heat shall be rejected into the ambient space from light cooling system. Coolant to this lamp system will be provided the refrigeration system.
- (3) The Refrigeration and Air handling Module: shall contain the refrigeration, compressor, cooling coils and blowers.
- (4) The Power and Control Module: shall contain all entrance connections, circuit breakers for protection of operating equipment, lamp ballasts and instrumentation. Access panels on all sides enable any part to be maintained with minimum interference.

## PERFORMANCE

Temperature	Shall be controllable to any set-point between 4°C and 40°C as measured on the reference plane. Variations at the control point shall not exceed $\pm 0.4^{\circ}\text{C}$ . Temperature on the reference plan may vary by $\pm 1^{\circ}\text{C}$ with full light intensity and by $\pm 0.5^{\circ}\text{C}$ with no lighting. Temperature ranges are: Lights OFF: $+4^{\circ}\text{C}$ to $+45^{\circ}\text{C}$ @ $35^{\circ}\text{C}$ Maximum Design Ambient Lights ON: $+10^{\circ}\text{C}$ to $45^{\circ}\text{C}$ @ $35^{\circ}\text{C}$ Maximum Design Ambient
Light Intensity	Shall be an average of $1400\ \mu\text{E}/\text{m}^2/\text{s}$ with uniformity of $\pm 10\%$ of mean as measured at 36" from the barrier on the reference plane. Maximum light performance is a result of a separate water handling system operating whenever the lights are energized.
Relative Humidity	Additive humidification by atomizing humidifiers providing a range up to 90% with lights OFF and 85% with lights ON. Dehumidification by refrigeration provides capacity of 40%, limited by a $45^{\circ}\text{F}$ dew point.
Air Flow	In the work area shall be from ceiling-to-floor through flow controlled diffusers. Air shall be conditioned by internal side wall heat exchanger.
Control Panel	The power and control module shall be provided for mounting all operating and control components, circuit breakers and ballasts. All service connections shall be made to this unit. An alarm or protective system shall be provided to alarm and/or shut down the chamber upon departure of temperature above or below the pre-set control point.

## CONTROL SYSTEM

Controller	EGC Model TC2 Microprocessor controller
Display	Three line LED data display. Back-lit LED output indicators and function annunciators.
Programming	Real time programming for all parameters. 200 steps for programming lights, temperature and humidity.
Program Entry	Program entry via a sealed membrane switch panel.
Edit & Examine	The operator may edit or examine any time line (starting at any time of day) and step through the whole program line by line, without affecting program content of losing control. A security code system prevents unauthorized program modifications without preventing examination of the program.
Alarms	Alarms alert user to temperature, RH, power failure and sensor problems. Separate from the electronic controller alarms, separate fail-safe mechanical alarms are provided which can be connected to the site alarm network.



Switching	All switching is by optically-isolated, 240V, 45 amp, individually replaceable, solid state relays.
Backup	Control program is retained by non-volatile EPROM.
Operational Features	Automatic Ramping or step changes of temperature, humidity and auxiliary set-points. Lights are controlled in multiple levels.
Service History	Elapsed On-time data is recorded to aid in proper maintenance of lamps. Service history may be user reset.
Ramping	Selectable global ramping for temperature and RH control.
Defrost	Automatic defrost cycle is provided with temperature terminate and inhibit.

## **LIGHTING**

Light Intensity	Chamber is provided with 1400 $\mu\text{moles}/\text{m}^2/\text{sec}$ measured 36" from the lamps using twelve (12) 400 watt HID lamps.
Spectrum	A balanced spectrum for plant growth using a mix of High Pressure Sodium and Metal Halide lamps
Uniformity	Will be +/-10% of the mean average when all lights are ON.
Programming Control	Lamps are wired in banks to allow three (3) levels of programming: Off, Half On, & All On.
Lamp Cooling	Lamp heat is removed by the conditioning system.
Ballasts	Ballasts are energized and de-energized by solid state devices. No electro-mechanical relays or contactors are used. Ballasts are thermally protected and easily accessible. Ballasts are numbered in relation to their bulb location within the canopy.

## **REFRIGERATION SYSTEM**

Mechanical System	The two phase direct expansion system provides fully proportional temperature control by continuous modulation of the liquid and hot gas phases of refrigerant entering the coil. Temperature differences between the chamber heat exchangers and chamber air are kept as small as possible to minimize unnecessary dehumidification and controlled zone deviations.
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Side Wall Heat Exchanger	The Side Wall Heat Exchanger (SWHX) is located in the side wall plenum of the chamber. Maximum area of exchange surface is provided to minimize cooling temperature differentials. Air is driven by fans located above the evaporator coils. Air enters the chamber through controllable top diffusers located just under the loft barrier, which do not block lighting, and exits through returns located near the floor.
Compressor	Self-contained, air-cooled, hermetically sealed, condensing unit.
Evaporator	Copper-tube, aluminum-finned construction.

## CONSTRUCTION

Chamber Dimensions	<p>Outside: <b>84"W x 45"D x 103"H</b></p> <p>Inside: <b>72"W x 36"D x 48"H</b></p> <p>Growth Area: 18ft<sup>2</sup></p> <p>Growth Height: 48" H from floor to underside of barrier</p>
Wall Construction	Panels shall consist of .040" embossed aluminum skins laminated to 2" thick foamed polystyrene core. Wall materials shall be sealed and secured. Inside wall surfaces to be covered with specularly reflective weatherable construction. Chamber drainage shall be provided by a one piece external connection point.
Chamber Access	Shall be through one (1) 36" x 36" light-tight door on the front side of the chamber. Door shall include a view window with light-tight cover.
Chamber Ceiling	Shall be an easily removable ¼" Plexiglas barrier, seated on a foam gasket providing minimum light interference. The barrier reduces the thermal heat load within the growing zone produced by the chamber lights. Barriers shall be interchangeable with barrier materials of other spectral properties.

## SERVICE REQUIREMENTS

Electrical	<p>(1) Chamber -120-240V/3 Phase/ 30 Amp DELTA-center tapped-Neutral grounded Service</p> <p>(2) Condensing unit -120-240V/3 Phase/ 20 Amp DELTA-center tapped-Neutral grounded Service, with a fused disconnect</p>
Water	Relative Humidity: .5 gph clean/filtered water